

REMARKS/ARGUMENTS

This case has been carefully reviewed and analyzed in view of the Official Action dated 1 September 2006. Responsive to the rejections made in the Official Action, Claims 1 and 19 have been amended to clarify the combination of elements which form the invention of the subject Patent Application.

In the Official Action, the Examiner rejected Claims 1-11, 19-21 and 24-26 under 35 U.S.C. § 102(a), as being anticipated by Schleier-Smith, et al., U.S. Patent 6, 669,918, and also rejected those same Claims under 35 U.S.C. § 102(e), as being anticipated by Schleier-Smith, et al. Still further, the Examiner rejected Claims 1-11, 13-16, 19-22 and 24-26 under 35 U.S.C. § 103(a), as being unpatentable over Schleier-Smith, et al.

Before discussing the prior art relied upon by the Examiner, it is believed beneficial to first briefly review the method and structure of the invention of the subject Patent application, as now claimed. The invention of the subject Patent Application is directed to a method for bulk separation of single-walled tubular fullerenes based on helicity. The method includes the steps of providing a plurality of single-walled tubular fullerenes of differing helicity, and providing a substrate having a lattice structure and an exposed upper surface. The method further includes the step of directing a flow of the plurality of single-walled tubular fullerenes across the upper surface of the substrate. The flow is parallel with the upper surface of the substrate and at an angle with respect to an axis of

the lattice structure of the substrate. The angle is selected to attract and hold single-walled tubular fullerenes of a predetermined helicity to the substrate. Further, the method includes the step of removing the single-walled tubular fullerenes held to the substrate.

From another aspect, as defined in Claim 19, the invention of the subject Patent Application is directed to a system for bulk separation of single-walled tubular fullerenes based on helicity. The system includes a container of a fluid bearing single-walled tubular fullerenes. The single-walled tubular fullerenes have a longitudinal axis. The system includes a dispensing assembly having at least one outlet for discharging the single-walled tubular fullerenes in a directed flow and at least one inlet coupled in fluid communication with the container and spaced from the outlet. The system includes a substrate having a lattice structure and an exposed upper surface disposed in relation to the outlet of the dispensing assembly for the directed flow to be in parallel with the upper surface. The lattice structure of the substrate has a selected axis disposed in an angular relationship with respect to the directed flow from the at least one outlet of the dispensing assembly. The axis is at an angle selected to attract and hold single-walled tubular fullerenes of a predetermined helicity to the substrate as the single-walled tubular fullerenes flow across the upper surface of the substrate. The system further includes a drainage assembly disposed adjacent to the substrate for carrying off any of the fluid bearing single-walled tubular fullerenes not held on the substrate.

In contradistinction, the system of Schleier-Smith, et al. requires the formation of a template having a plurality of openings, each opening being oriented at an angle for holding a tubular fullerene of a predetermined helicity and dimensioned for receiving a single tubular fullerene therein. The template is exposed to a suspension of single-walled tubular fullerenes of random chiralities for adsorption of fullerenes having the selected chirality, based on the angle of the openings in the template. The suspension of tubular fullerenes may be agitated or exposed to electrodynamic forces for propelling the tubular fullerenes toward the substrate. However, nowhere does the Schleier-Smith, et al. reference disclose or suggest directing a flow of the plurality of single-walled tubular fullerenes across the upper surface of the substrate, the flow being parallel with the upper surface and at an angle with respect to an axis of the lattice structure of the substrate, the angle being selected to attract and hold single-walled tubular fullerenes of a predetermined helicity to the substrate, as now claimed. While the Schleier-Smith, et al. reference seeks to take advantage of the known attraction between the lattice of the single-walled tubular fullerenes and the lattice of the substrate, the reference in no way suggests that the forces of attraction between the lattice structures is sufficient to overcome the fluid dynamic forces propelling the single-walled tubular fullerenes as they flow across the surface of a substrate in the directed flow of the instant invention. That realization was only arrived at subsequent to the invention of Schleier-Smith, et al. when attractive forces between single-walled

tubular fullerenes and the lattice of the substrate were calculated. Those calculations indicated a much greater than expected amplitude of the forces, based on any of the scientific literature that had been published at that time, as well as demonstrating the high degree of selectivity obtained at the locking angles by the sharpness of the peaks. It was the results of these calculations which led the Inventors to the concept of separating single-walled tubular fullerenes based on helicity by flowing the fullerenes across the surface of a substrate at the locking angle for a selected helicity. Neither the directed flow method nor the apparatus required for such is disclosed or suggested in the Schleier-Smith, et al. reference and such was not contemplated by the inventors of template method at the time the Schleier-Smith, et al. Application was filed, which inventors are co-inventors of the instant Patent Application.

In Schleier-Smith, et al., the closest to a directed flow that is disclosed is the use of an electrodeposition method shown in Fig. 4. In the electrodeposition method, an electric field between the electrode 50 and the substrate 30, 40 causes a “flow” of tubular fullerenes orthogonal with respect to the surface of the substrate. Thus, the reference clearly teaches away from directing a flow of the plurality of single-walled tubular fullerenes across the upper surface of the substrate, the flow being parallel with the upper surface and at an angle with respect to an axis of the lattice structure of the substrate, as now claimed.

As the method of the invention of the subject Patent Application is clearly different from that of Schleier-Smith, et al., the structure of the apparatus for performing those methods must inherently be different. Contrary to the Examiner's assertion, nowhere does the reference disclose or suggest a dispensing assembly having at least one outlet for discharging the single-walled tubular fullerenes in a directed flow and at least one inlet coupled in fluid communication with the container and spaced from the outlet, and nowhere discloses or suggests a substrate having a lattice structure and an exposed upper surface disposed in relation to the outlet of the dispensing assembly for the directed flow to be in parallel with the upper surface, the lattice structure of the substrate having a selected axis disposed in an angular relationship with respect to the directed flow from the at least one outlet of the dispensing assembly, the axis at an angle selected to attract and hold single-walled tubular fullerenes of a predetermined helicity to the substrate as the single-walled tubular fullerenes flow across the upper surface of the substrate, as now claimed.

The method of the invention of the subject Patent Application, as further defined by the limitations of the dependent Claims are also distinguishable from the method of Schleier-Smith, et al. and are believed to be patentably distinct therefrom. Likewise, as the method of the invention of the subject Patent Application is distinguishable from the method of Schleier-Smith, et al., so are the further limitations of the Claims dependent on independent Claim 19.

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Therefore, as Schleier-Smith, et al. fails to disclose each and every one of the method steps and elements which form the invention of the subject Patent Application, as now claimed, it cannot anticipate that invention. Further, as the reference fails to suggest such a combination of elements, and in fact teaches away from that combination, it cannot make obvious the claimed invention either. Thus, it is now believed that the subject Patent Application has been placed in condition for allowance, and such action is respectfully requested.

Respectfully submitted,
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